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ABSTRACT

A research project was conducted to investigate sensory, concept, and locomotion skills in severely multiply handicapped children. The project involved the development of evaluation and teaching materials to be utilized by classroom teachers and paraprofessionals with multi-handicapped children with severe visual deficits. The programed instructional system consisted of a criterion referenced assessment instrument and corresponding programed instruction training package. The content of the intervention system included basic motor, sensory, concept, and basic protective mobility skills. Results of a multi-state validation study using 60 multiply handicapped blind children (5 to 13 years old) indicated that Ss using the intervention system made significant progress on all skill areas included in the materials. (Author/SBH)

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ORIENTATION AND MOBILITY FOR MULTIPLY HANDICAPPED BLIND CHILDREN

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The content of this paper is based on the research conducted by Randall K. Harley, John B. Merbler, and the writer at Peabody College in 1975 and 1976. The project was funded through the Bureau of Education for the Handicapped, Office of Education, U.S. Department of Health, Education, and Welfare.

Introduction

In recent years a demand has grown for extending basic orientation and mobility instruction to include multiply impaired blind children. Some teachers have felt that the basic skills necessary for semi-independent and independent travel can be learned successfully by low functioning multiply impaired children who have a variety of handicapping conditions.

A review of the literature indicated that previous efforts had been undertaken to define areas in mobility instruction needed by low functioning blind individuals (Eichorn and McDate, 1969; Seelye and Thomas, 1966). These efforts focused on the modification of the conventional skills taught to higher functioning blind persons. The literature also revealed that scales had been developed by Francis Lord (1966; 1969) to measure orientation and mobility competency in young children.

The scales included self-help skills and orientation and mobility skills such as movement in space, use of sensory cues in travel, and use of directions and turns in travel.

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Drawing upon these few studies reported in the literature and the experience of the researchers, a pilot study was undertaken (Harley, Wood, and Mertler, 1975) and completed prior to the beginning of this project. The objectives of the pilot study were to determine the feasibility of systematic instruction in orientation and mobility to be used by teachers of multiply impaired blind children; to develop an assessment instrument; and to prepare a program of instruction. The sample, from the Nashville area, was a small group of multiply impaired blind children who functioned in social maturity at a preschool level.

The subscales taken from the scale developed by Lord (1969) which were deemed appropriate were administered to the selected population. After administration and scoring, each subscale was either adapted or completely revised to suit the needs of multiply impaired children.

The revised items were reviewed by a panel of special consultants consisting of orientation and mobility specialists and experienced teachers of multiply impaired children. Based on the recommendation of these professionals, a decision was reached concerning the basic locomotor skills, sensory training areas, and the most important concepts needed by these children in order to travel independently within their environment. In addition, five basic mobility skills were felt to be important and within the capabilities of low functioning blind children. These areas included use of a sighted guide, seating, trailing, protective skills and route travel.

The revised scale was again administered to the multiply impaired children. Video tapes were made of the administration with selected children in order to help standardize the new instructional procedure. The revised scale (Peabody Mobility Scale, 1975) was used as the basis for programmed instruction in orientation and mobility for multiply impaired blind children.

Programmatic instruction was designed for each item in the subscales. Each lesson was divided according to the purpose, task objective, materials needed, pretest, and suggested educational program. Enrichment activities were listed at the end of many of the lessons not only to provide variation but to insure sufficient practice to obtain the desired skill. Each lesson was programmed in small sequential steps and flow charts were diagrammed with directions to the teacher showing when to give commands, when to reinforce, when to repeat cycles, and when to proceed to the next step.

Following the initial development of the assessment instrument and programmed instructional system, the next phase of this project consisted of field testing this system to determine its effectiveness as the basis for a teacher implemented basic orientation and mobility program for severely handicapped blind children.

Method

Site Survey

A total of 23 facilities serving visually impaired and/or developmentally delayed children within a 500 mile radius of Nashville, Tennessee, were surveyed and asked to respond with the number of children enrolled in their programs who were both visually impaired and who demonstrated at least one additional handicapping condition. The results of this survey indicated nine facilities which seemed to have a substantial number of children who qualified for inclusion in the instructional materials field testing program. The nine facilities included: four state residential schools for the blind, four developmental centers, and one public school program.

Subjects

A total of 110 children enrolled in the nine selected facilities were screened as potential subjects for the instructional materials field test. The final experimental population was constituted on the basis of five criteria. These criteria included:

1. Range in chronological age from 4 years to 13 years 11 months.
2. Possess a visual handicap of light perception or less (i.e., functioning non-visually in the environment).
3. Possess one additional handicapping condition.
4. Function on the preschool level between the ages of 2 and 6 years as measured on the Maxfield-Bucholz Social Maturity Scale.
5. Respond to verbal or manual communication.

Of the pool of 110 children, a total of 42 met the selection criteria. The preponderance of the children who were not selected were rejected on the basis of Criterion 2. Subject status relative to Criterion 2 was determined through informal observation by the experimenters and anecdotal reports by the children's classroom teachers and/or houseparents. Six children of the 42 selected were withdrawn from the experimental population during the course of the study due to chronic illness and extended absence. The mean chronological age (CA) of the subjects was 10 years 8 months, with a range of 5 years 2 months to 13 years 9 months. The social ages of the subjects ranged from 1.92 to 5.79 with a mean of 4.00.

Participating Teachers

Nine classroom teachers located at the sites from which the subjects were selected provided instruction in basic mobility skills to the experimental subjects using the programmed instructional materials. The teachers were selected on the basis of administrative feasibility with the stipulation that they had not had any formal training in teaching mobility.

Three of the teachers were physical education specialists for multiply handicapped children, one teacher was a mathematics instructor for high functioning blind children, and the remaining four participants were classroom teachers for multiply handicapped children. All of the teachers had a minimum of two years of classroom teaching experience.

Materials

The Peabody Mobility Scale was used for the assessment of the subject's level of skill development in motor, sensory, concept and basic mobility domains. The PMS was described earlier.

The Maxfield-Bucholz Social Maturity Scale for Preschool Blind Children (Maxfield-Bucholz, 1957) was used to assess the subject's general level of functioning. The Scale is an adaptation of the Vineland Social Maturity Scale (Doll, 1937) and follows an interview format. It consists of 95 items arranged according to the developmental year level of expected item fulfillment within the skill categories of (a) Self-help general, (b) Self-help dressing, (c) Socialization, (d) Locomotion, and (e) Occupation. The Maxfield-Bucholz Scale yields a Social Age (SA) which is the sum of the number of months credit a child earned as a function of the number of months credit a child earned as a function of the number of items he passed, and a Social Quotient (SQ) which is the ratio of a child's chronological age to his Social Age.

The Peabody Programmed Instruction System in Orientation and Mobility (Harley, Wood, Merbler, unpublished) was used as the basis of the training program to determine its instructional effectiveness. A detailed description of this training system is included later in this report.

Experimental Design

This study employed one experimental group and two control groups within a pretest-posttest design. The subjects in the experimental group

received daily intervention using the programmed orientation and mobility instruction materials. In contrast, children in the control groups continued their daily educational routines without special intervention programming based on the experimental intervention system. The content of the educational programs of the control children varied considerably over subjects as a function of the developmental level of each subject and his particular placement facility. Several control children were receiving instruction in skill areas very similar to those included in the experimental instructional materials while other control children were receiving maintenance care (e.g., toileting, feeding, etc.) in an unstructured ward program.

Although the use of on-site control children minimized the effect of a potentially very powerful confounding variable, it simultaneously increased the possibility of a second confounding event--specifically, control group contamination as a result of proximity to the experimental treatment.

To reduce the likelihood of experimental-control condition contamination, a second "distal" control group was employed in the study. Distal control group subjects were located at three sites at which no experimental intervention was planned. Hence, subjects in the distal conditions were totally isolated from the effects of the experimental treatments. The inclusion of this group provided a baseline against which experimental-site control contamination could be readily detected and measured.

The experimental and control groups were constituted through two levels of randomization. The distal control sites were chosen at random from among the nine facilities participating in the study. Within each of the remaining six facilities, subjects were randomly assigned to either the experimental or on-site control conditions. Eighteen children were assigned to the experimental group, and nine children were included in each of the two control conditions.

The primary data analyzed in the field test study were the scores the subjects attained on the PMS. Although the PMS is not designed for a global score evaluation of a pupil's mobility proficiency, it was necessary to quantify the behaviors a subject demonstrated during assessment to expedite analysis and evaluation of the effects of the intervention system. Consequently, each behavioral description was point weighted as follows:

Independent (I) = 2 points
With Assistance (WA) = 1 point
Not Performed (NP) = 0 points
Not Applicable (NA) = ----(not averaged)

The points a subject earned for each item (five sub-items per item equaled a possible score range of 0 to 10 points per item) were tallied over each sub-section (e.g., motor, sensory). The sub-section totals were then summed to obtain a full scale PMS score.

Procedures

Following the initial assessment, the field testing of the programmed instructional materials was conducted during a 16 week period beginning in January, 1976 and extending through May, 1976. The researchers provided teacher orientation through on-site training. The teachers were encouraged to telephone or write the project staff regarding any questions which arose during the intervention period.

The 16-week field testing period was divided into two eight-week phases. The first eight week period focused on sensory and motor components of the instructional materials. During this first phase, the teachers worked on an individual basis with the experimental subjects in their classrooms on the motor and sensory skill deficiencies indicated in the subject's instructional prescriptions. The teachers worked on two programmed lessons a day--one motor and one sensory. The teacher spent a mean time of 20 minutes per lesson per day. In some instances, the teachers delegated

responsibility for implementation of the lessons to their classroom aides. The second eight-week period was devoted to the concept and mobility portions of the instructional materials and followed the same general procedures used during the first phase of the field testing.

Subjects were posttested on motor and sensory skills at the completion of the first eight-week period. Posttesting on concept and mobility skills occurred at the completion of the second eight-week period.

Teacher evaluations of the instructional materials were solicited to supplement the empirical validation of the effectiveness of the intervention system. Two types of information were obtained, including: (1) teacher recommendations for modifications of specific training sequences; and (2) overall rating of training sequence effectiveness. The teachers were requested to complete evaluation forms after using each training sequence.

The teachers also collected continuous data on the students' progress as the students worked through the instructional materials. These data consisted of records of the number of trials a student passed and failed during each training session based on the instructional materials. The teachers transmitted the completed data forms to the project staff on a weekly basis. Their data served two functions: (1) project staff monitoring of teacher intervention activities; and (2) teacher and project staff monitoring of the progress of the children. No formal statistical analysis was conducted on those data.

Results

The results of a 2 X 2 analysis of covariance indicated that the PMS scores of the experimental group subjects were significantly higher than the control group subjects. The social ages of the subjects were used as a

covariate to adjust both pre- and posttest means. A comparison of the pre- and posttest means for the site and distal control groups suggested that no experimental site control group contamination occurred during the intervention period.

A post hoc analysis was conducted to determine if significant gains occurred across the four skill domains. Significant t statistics were found for motor ($t = 5.34$, 18 df, $p = .01$), sensory ($t = 6.46$, 18 df, $p = .01$), concept ($t = 5.31$, 18 df, $p = .01$), and mobility ($t = 6.72$, 18 df, $p = .01$) instructional components. These findings indicated that substantial post intervention performance improvements were demonstrated by the subjects across all intervention system content areas.

Discussion

The purpose of this study was to develop an effective programmed intervention system in orientation and mobility for multiply handicapped blind children. The very positive results of the field test study indicated that this objective has been fulfilled.

The children who served as subjects in this study represented a fairly good cross pattern of handicapping conditions which can be encountered when providing training services to multiply handicapped blind children and youth. Children included in the experimental population demonstrated severe developmental (cognitive) delays, physical impairments, behavioral problems, severe expressive receptive language deficits, auditory impairments, and, of course, blindness. Although it was impossible to include every potential constellation of multiple impairments, the breadth of the field test sample should insure the general applicability of the intervention system for children classified as multiply handicapped blind. Further, since the preponderance of skills included in the assessment and training materials are also necessary for non-visually impaired children, sections of the intervention

system (e.g., motor and concepts) may be useful for training, for example, trainable level retarded children.

In addition to validating the intervention system, the results of the field test study also provided information on several relevant educational issues concerning multiply handicapped blind children. First, the significant performance gain demonstrated by the experimental group subjects indicates that severely multiply handicapped blind children can learn basic motor, sensory, concept and mobility skills. The optimal instructional approach for training these skills seems to be through the use of carefully programmed training sequences. This contention is supported by the failure of the control group children to demonstrate significant progress despite the fact that many of these control subjects (both site and distal) were receiving daily training in basic motor, sensory and concept skills in a less structured manner as a part of the teacher's normal curriculum.

The results of the field test study also indicated that classroom teachers can effectively train multiply handicapped blind children in basic orientation and mobility skills if they are provided with programmed instruction. Thus, it would seem that classroom teachers could function as principal basic mobility trainers for multiply handicapped blind children if their particular programs lacked a mobility specialist, or could supplement the mobility instruction services of an on-site specialist.

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